



## **A TRAY FOR TRANSPORTING VEHICLE WHEELS AND/OR WHEEL RIMS, AND ASSOCIATED ASSEMBLY AND SUPPORT**

### **BACKGROUND OF THE INVENTION**

**[0001]** The present invention relates to a tray for accommodating and transporting wheels and/or wheel rims of different diameters and configurations, as well as to an assembly formed by the tray and wheels and/or wheel rims, and to a support for use with this tray.

**[0002]** Conventionally, vehicle wheels are transported from the factory to their final destination (at the vehicle assembly factories) on trays, also known as pallets, where a plurality of wheels are positioned so that a wheel will not touch neighboring wheels, which might damage the paint on the wheels. In order to enable one to stack wheels, which maximizes the amount that may be carried on a single tray, spaced-apart small stops are provided, positioned on a flange of the wheels, so that a wheel positioned above another wheel will touch only this spacer, thus preventing scratches in the paint, which would certainly occur due to movement during transport.

**[0003]** Another possibility of avoiding scratches in the paint of stacked wheels is the use of cardboard partitions or the like between the wheels.

**[0004]** Both situations have drawbacks, namely:

**[0005]** 1) In the case of using the spacers, the big drawback is the need to use a large number thereof (preferably four spacers per wheel), which need to be manually positioned and fitted on the flanges of each wheel, in order to allow another wheel to be stacked without directly touching the next wheel. The need to mount each spacer manually is a factor that reduces the speed of stacking the wheels and, consequently, completing the trays, which culminates in considerably reducing the speed of sending the produced wheels to the vehicle manufacturer.

**[0006]** Another disadvantage of this system is that, since each spacer is a small component provided with delicate claws, the spacer may be easily lost or damaged, and so there is a need to constantly replace spacers, which entails additional costs that may not be disregarded.

**[0007]** 2) In the case of using cardboard partitions, the positioning is no longer a problem, since the partition is positioned over the wheels, thus enabling one to accommodate further wheels, without their touching wheels located below. However, the problem of reduced useful life of the partition remains and, moreover, the use thereof imparts an appearance of improvisation and permits movements of the wheels to the sides.

**[0008]** With a view to achieve a solution to the problem of side movement of the wheels, document WO96/24530 discloses a tray for accommodating wheels having recesses that define circumferences of varied diameters with common stretches, thus enabling one to transport the wheel, including those of different diameters, without side movement taking place. However, this solution has the drawback of requiring a significant amount of material to make the tray, which is expensive due to the large thickness necessary to make the layers for fitting the wheels. Besides, the problem of the need for a spacer or a partition that enables one to stack the wheels is not solved.

**[0009]** Document DE4339445 discloses a tray having several configurations of guides for accommodating wheels, including those of different diameters. These guides prevent the rims from moving to the sides in addition to fitting them into the tray. The guides are configured to permit little flexibility with regard to the sizes of diameters of the wheels to be transported. However, this tray does not solve the problem of the need for a spacer or partition to enable one to stack wheels.

**[0010]** Japanese document JP8026283 discloses a tray for accommodating and transporting automotive wheels, which has grooves in its surface corresponding to the diameters of the wheels to be transported. These grooves are configured in such a way that the tray can receive and accommodate wheels of different diameters, without allowing them to move to the sides. The difficulty encountered in this solution is the configuration of the grooves, which requires steps of high manufacture cost. In addition, this solution does not solve the problem of the need for a spacer or partition that will enable one to stack wheels either.

**[0011]** Until now, nobody has proposed a tray having a support to prevent the wheels to be transported from moving to the sides and enabling one to stack wheels without contact between them that might cause damage.

**[0012]** Accordingly, one objective of the present invention is to provide an easy-to-use tray for transporting and stacking wheels and wheel rims, with a low manufacture cost, which enables one to transport wheel rims and vehicle wheels, prevents them from moving to the sides, and enables one to stack them, without their touching each other, which might cause damage to them.

**[0013]** A second objective of the present invention is to provide an assembly of tray and wheels or wheel rims that brings about the above-mentioned advantages.

**[0014]** Another objective of the present invention is to provide a support for use with the above-described tray and assembly.

### **SUMMARY OF THE INVENTION**

**[0015]** The objectives of the present invention are achieved by a tray, particularly for transporting vehicle wheels and/or vehicle-wheel rims, provided with at least one substantially planar structure and at least two first supports, where each of the first supports comprises at least one first guide-and-positioning element. The two first supports are associated to the planar structure in a cooperative way, with the first guide-and-positioning elements of the associated two first supports defining at least one first region for horizontal accommodation of at least one of a vehicle wheel and a vehicle-wheel rim. The tray further comprises at least two second supports, each of the second supports comprising at least one second guide-and-positioning element associable to a horizontally accommodated wheel or wheel rim, and at least one third guide-and-positioning element. The two supports are associable to the wheel or wheel rim so that the third guide-and-positioning elements will define at least one second region for horizontal accommodation for at least one of a wheel and a wheel rim.

**[0016]** The objectives of the present invention are also achieved by an assembly of tray and wheels and/or wheel rims, provided with at least one wheel or wheel rim and at least one tray formed by at least one substantially planar structure and at least two first supports, where each of the first supports comprises at least one first guide-and-positioning element. The two first supports are associated to the planar structure in a cooperative way, with the first guide-and-positioning elements of the two associated first supports defining at least one first region for horizontal accommodation of a vehicle wheel or vehicle wheel rim. The tray further comprises

at least two second supports, each of the second supports comprising at least one second guide-and-positioning element associated to the horizontally accommodated wheel or wheel rim, and at least one third guide-and-positioning element. The second two supports are associated to the wheel or wheel rim so that the third guide-and-positioning elements will define at least a second region for horizontal accommodation of at least one wheel or wheel rim.

[0017] Further, the objectives of the present invention are achieved by a support, particularly for use with a tray for transporting vehicle wheels and/or vehicle-wheel rims, as defined above, having a shape of a substantially rectangular plate and comprising a first main surface provided with a plurality of guide-and-positioning elements arranged as semicircular projections.

[0018] The present invention has the following advantages, among others:

[0019] – possibility of transporting vehicle wheel rims and vehicle wheels, which are easily stacked without the risk of the wheels colliding with each other, which might cause damage to their paint;

[0020] – possibility of stacking a large number of wheels;

[0021] – no need to use small plastic spacers, which might be easily lost or damaged;

[0022] – long durability of the supports, by virtue of their large size.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0023] The present invention will now be described in greater detail with reference to an embodiment represented in the drawings. The figures show:

[0024] Figure 1 is a perspective view of the tray for transporting wheels and/or wheel rims of the present invention;

[0025] Figure 2 is a perspective view in detail of the tray illustrated in Figure 1;

[0026] Figure 3 is a top view of the tray for transporting wheels and/or wheel rims of the present invention, prepared for stacking wheels;

[0027] Figure 4 is a perspective view in detail of the tray of the present invention supporting stacked wheels;

[0028] Figure 5 corresponds to a bottom view of a second tray support according to the present invention; and

[0029] Figure 6 corresponds to a top view of the second tray support according to the present invention.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

[0030] According to a preferred embodiment and as can be seen in Figure 1, a tray 1 of the present invention for fitting vehicle components such as wheels and wheel rims comprises a substantially planar structure 5, at least two first supports 2, and at least two second supports 2' allowing accommodation of at least two vehicle wheels 6 or vehicle wheel rims in a horizontally stacked way.

[0031] The structural element or planar structure 5 is substantially rectangular in shape and is preferably formed by a plurality of joined wooden lathes, but it is evident that the constitution thereof may vary. Alternatively, one may conceive a structure of a polymeric material or any other possible configuration. Preferably, but not compulsorily, the planar structure 5 has at least one recess (not illustrated) to correctly position a stacking spear, which enables the vehicle to take the tray 1 out of and put it in a desired place, such as on a truck, or even to move it along an industrial plant. Evidently, the structure may assume any other necessary and/or desirable configuration, as long as it is functional, without the resultant tray departing from the scope of protection of the present invention.

[0032] Whatever the embodiment, the planar structure 5 has at least two, but preferably four, first supports 2, which are associated with the planar structure 5 so that the first supports 2 will cooperate two by two with each other, as will be explained in detail later. Evidently, the number of first supports 2 may vary, as necessary or desired.

[0033] Each first support 2 substantially has the shape of a rectangular plate, defining a first main surface or side and having a length considerably larger than its width and, preferably but not compulsorily, equivalent to the length of the planar structure 5.

[0034] The first main surface is the one which is not facing the planar structure 5, and which has at least one, but preferably a plurality of, first guide-and-positioning elements 3.

[0035] The first guide-and-positioning elements 3 are used to correctly position the wheel or wheel rim 6 on the planar structure 5, preventing the wheel from

moving sideways (laterally with respect to the supports), which, if it occurred, would cause the wheel to touch a neighboring wheel, resulting in damage to the paint of the wheels. The preferred shape presented by the first guide-and-positioning elements 3 (which will hereinafter be called the first guides 3) is that of a semicircular projection, with a diameter only fractionally larger than a diameter of the wheel or wheel rim 6 to be accommodated.

**[0036]** It should be noted that the wheel components, i.e., the wheels or wheel rims 6, are positioned in a horizontal way, that is to say, a flange of one wheel side will be facing the planar structure 5. In this way, devices that prevent the wheel component from moving angularly are not necessary, due to this positioning.

**[0037]** Evidently, the shape of the first guides 3 may be any shape, as long as the shape enables one to position and fix the wheel or wheel rim 6 correctly, preventing lateral movement. Alternatively, the first guides 3 may assume other configurations, such as annular segments, punctual projections or any other configuration.

**[0038]** Whatever their shape, the first guides 3 correspond to projections that extend from the first main surface of each first support 2.

**[0039]** The preferred embodiment of the tray 1 of the present invention comprises four main supports 2, positioned substantially parallel to each other, so that two supports will be located at longitudinal ends of the structure 5 with two other supports being located between them. As a result, one first support 2 and a neighboring first support 2 define a region 4 (accommodating region) for horizontal accommodation of a wheel or wheel rim 6, which is delimited by the first guides 3 of these first supports 2. So, in the preferred embodiment, two adjacent first supports 2 define three regions 4 for horizontal accommodation wheels or wheel rims.

**[0040]** As can be seen in Figures 1 and 2, the preferred embodiment of the present invention has two types of first supports 2, namely, the two first supports 2 that will be located at the longitudinal ends of the planar structure 5, each of which has three first guides 3 and configures a first end support; and the two first supports 2 that are located between the first supports 2 at the longitudinal ends, each of which has six first guides 3 arranged adjacently three by three and configuring a first intermediate support.

**[0041]** Figure 2 shows a first intermediate support 2, with the two first adjacent guides 3 being shaped as a semicircular or arcuate projections, which have

opposing open ends. Each first intermediate support 2, due to the first guides 3, enables one to position six wheels or wheel rims 6, three of each with one of the adjacent first supports 2 at the longitudinal ends. The first intermediate supports are then similar to two side by side end supports, since the first guides 3, which are arranged adjacent to each other, are facing opposite directions.

[0042] In the case of the first end supports 2, since they have only one adjacent support, they do not need to have the three additional first guides 3.

[0043] However, the configuration of the supports may evidently vary. Alternatively, it is possible to provide the tray 1 having four identically configured first supports 2, wherein even the end supports would have six first guides 3, or else any other possible configuration, as long as the first resulting supports 2 enable one to accommodate wheels or wheel rims 6 in such a way that they will not move laterally.

[0044] Preferably, the first supports 2 are made from a polymeric material, such as polyethylene for example, but it is evident that this material may be replaced by any other functional material, such as other polymers, metals or even wood.

[0045] Also, one may configure a first support 2, on which the first guides 3 do not correspond to the projections that extend from its first surface, but rather to recesses located in this same surface.

[0046] It should be further noted that one may provide a tray 1 according to the teachings of this invention, wherein the first supports 2 are integral part of the structure 5, independently from their embodiment and number.

[0047] As mentioned before, the tray 1 of the present invention further has at least two, but preferably a plurality of, second supports 2', very similar to the first supports 2 described above, which allow stacking of wheels or wheel rims 6 (increasing the transport capacity of the tray 1 disclosed now), without the wheel components touching each other, and to prevent the wheels or wheel rims from moving to the sides. Such movement could cause damage to the paint on the wheels, generating rejection by a buyer and, therefore, considerable losses.

[0048] In order to enable one to stack wheels or wheel rims 6, it is necessary that all the regions for horizontal accommodation defined by the first supports 2 accommodate wheels or wheel rims, with all of the accommodated wheel components having the same width, due to reasons that will be explained later.

[0049] The preferred embodiment of the tray 1 comprises four second supports 2', each having substantially the shape of a rectangular plate, defining a first

main surface 7 and a second main surface 7' opposite to the first main surface 7, and having a length considerably larger than its width. Preferably, the length of the second supports 2' is equivalent to the length of the planar structure 5 and of the first supports 2.

**[0050]** The second supports 2' are placed over the wheels or wheel rims 6, which occupy the first regions 4 of horizontal accommodation already mentioned, where they can play the role for which they are designed (and which has already been informed above), namely, to enable one to stack wheel components on wheel components that have already horizontally accommodated, without their touching each other, and to prevent them from moving to the sides. If the accommodated wheels or rims 6 have different widths, it will not be possible to rest the second supports 2' on top of the already accommodated wheels because, since the wheels are horizontally accommodated, a wheel or wheel rim having a larger width will be higher. This might make unfeasible to rest the second supports 2' on top of the wheels.

**[0051]** Considering a second support 2' already positioned over the wheel components, as illustrated in Figures 3 to 6, the first main surface 7 faces the already positioned wheel components (and ultimately faces the planar structure 5), and the second main surface 7', opposite the first main surface 7, is that on which other wheels or wheel rims 6 will be accommodated.

**[0052]** The first main surface 7 of the second support 2' has second guide-and-positioning elements 3' (referred to as second guides 3'), preferably in a number and positioning identical to those of the first guides 3 of the corresponding first supports 2. This is necessary, since these second guides 3', located on the first main surface 7, cooperate with the already accommodated wheel components. Evidently, the shapes and positioning of the second guides 3' may vary, as long as they bring about an effect identical to that which would be achieved if the guides were identical to the first guides 3.

**[0053]** In case the second guides 3' of the first main surface 7 of the second support 2' have any differences that prevent an effect identical to that achieved by the first guides 3 of the corresponding first support 2, it would not be possible to position / fit the second support correctly at the already accommodated wheel components.



[0054] The second main surface 7' of the second supports 2', which, as already mentioned, is opposed the first main surface 7, also has a plurality of third guides 3'', positioned so as to enable one accommodate wheels or wheel rims 6 stacked on the already accommodated wheel components.

[0055] Preferably, the number and arrangement of third guide-and-positioning elements 3'', i.e., third guides 3'', which extend from the second main surface 7', are identical to those of the second guides 3' and, therefore, analogous to the first guides 3, which extend from the first supports 2. Evidently, however, the shape and number of the third guides 3'', which extend from the second main surface 7' of the second supports 2', may vary, as long as they are functional.

[0056] Therefore, in the preferred embodiment, the second supports 2' have all the third guides 3'' in a form of semicircular projections, with a diameter just fractionally larger than the diameter of the wheels or wheel rims to be accommodated. Preferably, the tray 1 has two second supports 2' locate at the longitudinal ends of the structure 5 and two second supports 2' located in the space defined between them. So, a second support 2' and an adjacent second support 2' define a second region for horizontal accommodation of a wheel or wheel rim, which is delimited by the third guides 3'' of these second supports. Thus, in the preferred embodiment, two adjacent second supports 2 define three regions for horizontal accommodation of a wheel or wheel rim. It should be noted that these characteristics are also presented by the first supports 2, for which they have already been described.

[0057] As can be seen in Figures 3 and 4, the preferred embodiment of the present invention has two types of second supports 2', namely: the two supports that are located at the longitudinal ends of the planar structure 5, each of which has three third guides 3'' and configuring a second end support; and the two supports that are located between the two end supports, each of which having six third guides 3'' arranged adjacent to each other three by three and configuring a second intermediate support.

[0058] As can be seen in Figure 3, the two adjacent third guides 3'' of the second support 2' in an intermediate location have the shape of a semicircular projection, with opposed open ends. Evidently, this results from the fact that each second intermediate support 2', due to the third guides 3'', enables the positioning of six wheels or wheel rims 6, three wheels with each of the adjacent second supports 21. The second intermediate supports 2' are then similar to two second end supports

side by side, since the third guides 3'' that are arranged adjacent are facing opposing directions.

**[0059]** All the information relating to variations of the guides that project from the first and second main surfaces 7, 7' of the second supports 2' are analogous to those presented by the first guides 3 of the first supports 2; so they will not be repeated.

**[0060]** Preferably, the second supports 2' are made from a polymeric material, such as polyethylene for example, but it is evident that this material may be replaced by any other functional material, such as other polymers, metals or even wood. One may also configure a second support 2', on which the guides do not correspond to projections extending from its first and second surface 7, 7', but rather to recesses located in these same surfaces.

**[0061]** One may also foresee the existence of third supports (not illustrated), analogous to the second supports 2', which enable one to stack one further level of wheels or wheel rims, as well as the existence of other additional supports, analogous to the second supports 2', which enable one to stack a plurality of wheels or wheel rims, thus maximizing the storage capacity of the tray 1.

**[0062]** The tray described herein and loaded with wheel components, correctly stacked and separated from each other by first and second supports 2, 2' described now, is called an assembly of tray and wheels or wheel rims, which is also an aimed invention and is included in the scope of protection of the claims. Further, the supports 2, 2' used on the tray 1 herein revealed is also included in the scope of protection of the claims.

**[0063]** A preferred embodiment having been described, one should understand that the scope of the present invention embraces other possible variations, being limited only by the contents of the accompanying claims, which include the possible equivalents.